PB-239 661

SINISSIPPI LAKE, DODGE COUNTY, WISCONSIN

Pacific Northwest Environmental Research Laboratory

Prepared for:

National Environmental Research Center
Wisconsin Department of Natural Resources
Wisconsin National Guard

October 1974

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1. REPORT NO.	2.	3. PB 239 661
4. TITLE AND SUBTITLE Report on Sinissippi Lake, Dodge County, Wisconsin		5. REPORT DATE Prepared October 1974 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Anonymous (National Eutrophication Survey Staff)		8. PERFORMING ORGANIZATION REPORT NO. Working Paper # 49
9. PERFORMING ORGANIZATION NAME AND ADDRESS Pacific Northwest Environmental Research Laboratory U.S.Environmental Protection Agency 200 S. W. 35th St. Corvallis, Oregon 97330		10. PROGRAM ELEMENT NO. 1BA029 11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency		13. TYPE OF REPORT AND PERIOD COVERED Final - 1972 14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES
Prepared in cooperation with the U.S. Environmental Protection Agency, National Environmental Research Center, Las Vegas, Nevada 89114

16. ABSTRACT
Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivded according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
eutrophication lakes nutrients phosphorus nitrogen loading		05B 05C

PRICES SUBJECT TO CHANGE

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report)	21. NO. OF PAGES
Release unlimited		33
	20. SECURITY CLASS (This page)	22. PRICE 3.75-2.25

REPORT

ON

SINISSIPPI LAKE

DODGE COUNTY

WISCONSIN

EPA REGION V

WORKING PAPER No. 49

WITH THE COOPERATION OF THE

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

AND THE

WISCONSIN NATIONAL GUARD

OCTOBER, 1974

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Wisconsin Department of Natural Resources for professional involvement and to the Wisconsin National Guard for conduct of the tributary sampling phase of the Survey.

Francis H. Schraufnagel, Acting Assistant Director, and Joseph R. Ball of the Bureau of Water Quality, and Donald R. Winter, Lake Rehabilitation Program, provided invaluable lake documentation and counsel during the Survey. Central Office and District Office personnel of the Department of Natural Resources reviewed the preliminary reports and provided critiques most useful in the preparation of this Working Paper series.

Major General James J. Lison, Jr., the Adjutant General of Wisconsin, and Project Officer CW-4 Donald D. Erickson, who directed the volunteer efforts of the Wisconsin National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

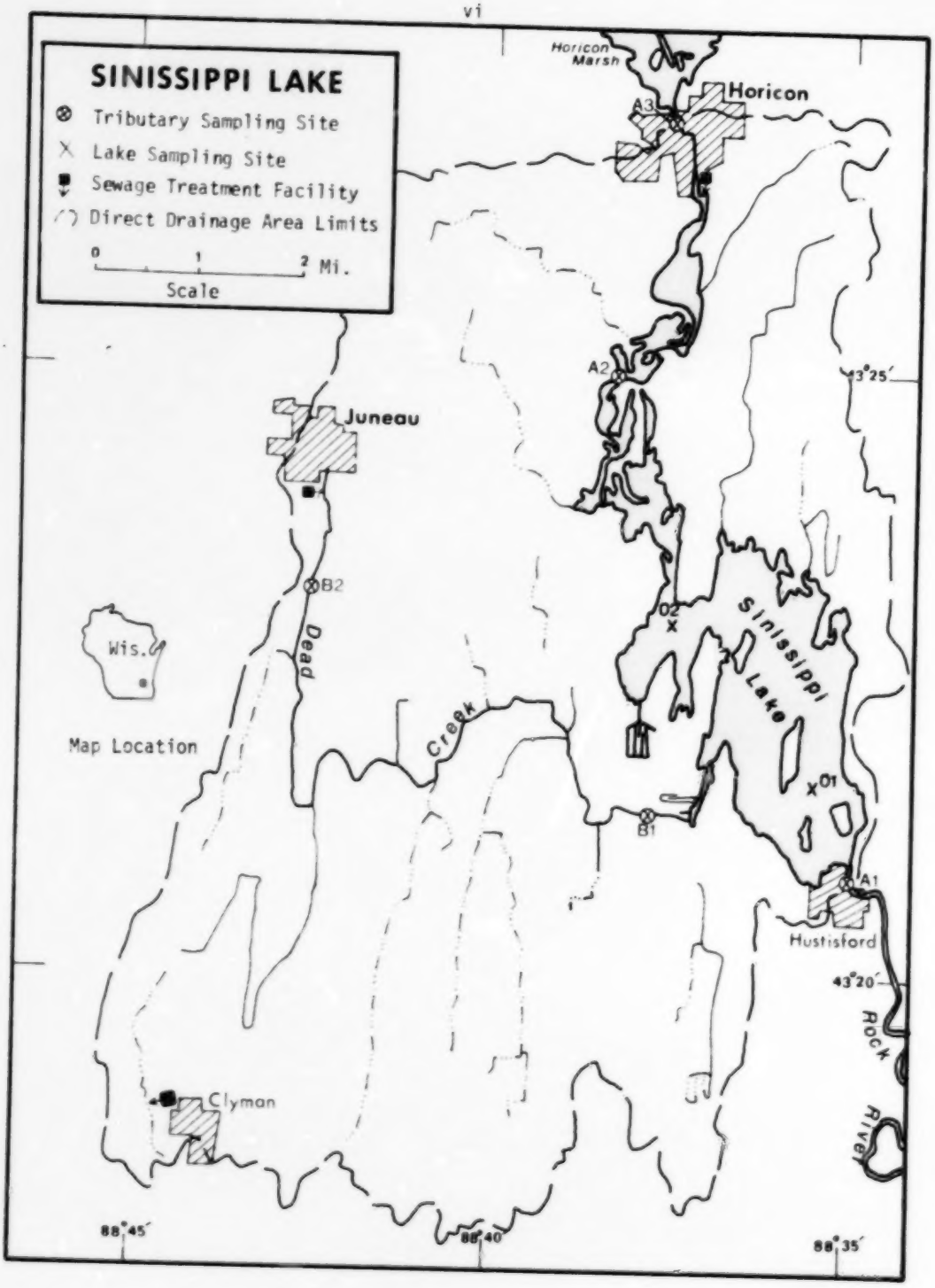
NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF WISCONSIN

LAKE NAME	COUNTY
Altoona	Eau Claire
Beaver Dam	Barron
Beaver Dam	Dodge
Big Eau Pleine	Marathon
Browns	Racine
Butte des Morts	Winnebago
Butternut	Price, Ashland
Castle Rock Flowage	Juneau
Como	Walworth
Crystal	Vilas
Delavan	Walworth
Eau Claire	Eau Claire
Elk	Price
Geneva	Walworth
Grand	Green Lake
Green	Green Lake
Kegonsa	Dane
Koshkonong	Jefferson, Rock, Dane
Lac La Belle	Waukesha
Long	Price
Middle	Walworth
Nagawicka	Waukesha
Oconomowoc	Waukesha
Okauchee	Waukesha
Petenwell Flowage	Juneau
Pewaukee	Waukesha
Pigeon	Waupaca
Pine	Waukesha
Poygan	Winnebago, Waushara
Rock	Jefferson
Rome Pond	Jefferson, Waukesha
Round	Waupaca
Shawano	Shawano

LAKE NAME	COUNTY
Sinnissippi	Dodge
Swan	Columbia
Tainter	Dunn
Tichigan	Racine
Townline	Oneida
Trout	Vilas
Wapogassett	Polk
Wausau	Marathon
Willow	Oneida
Winnebago	Winnebago, Fond Du Lac, Calumet
Wisconsin	Columbia
Wissota	Chippewa
Yellow	Burnett


SINISSIPPI LAKE
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Direct Drainage Area Limits
0 1 2 Mi.
Scale
Horicon Marsh
Horicon
A3
A2
43°25'
Juneau
B2
Wis.
Map Location
Dead Creek
O2
Sinissippi Lake
O1
B1
A1
Hustisford
43°20'
Rock River
Clyman
88°45'
88°40'
88°35'

SINISSIPPI LAKE

STORET NO. 5541

I. CONCLUSIONS

A. Trophic Condition

Limited survey data and the records of others show that Sinissippi Lake is quite eutrophic. It does not appear that the morphometry and derivation of the lake would permit any other trophic condition.

B. Rate-Limiting Nutrient:

This lake was not sampled in November because of a drawdown, and no algal assay sample was obtained. However, limited lake data indicate nitrogen limitation in June and August, 1972.

C. Nutrient Controllability:

1. Point sources--During the sampling year, Sinissippi Lake received a total phosphorus load at a rate over eight times that proposed by Vollenweider (in press) as "dangerous"; i.e., a eutrophic rate (see page 12). Of this load, point sources are estimated to have contributed about 11%. It is concluded that point-source phosphorus control would have little effect on the trophic condition of the lake.

2. Non-point sources--The estimated areal or non-point phosphorus contribution of Dead Creek is over three times greater than the relatively high contribution of the Rock River. The

high loadings and the N/P ratios of both streams suggest there are phosphorus point sources in the drainage not considered in this Survey (see page 12).

II. INTRODUCTION

Sinissippi Lake is a large, shallow impoundment of the upper Rock River at Hustisford. The original 12-foot dam was constructed in 1845 and was raised about two feet in 1939. Reportedly, the area flooded by the dam was a broad marshy valley, and impoundment resulted in a shallow, fertile environment well suited for carp. Extensive wetlands, including the well-known Horicon Marsh, characterize the drainage.

Recreational uses of the lake are largely restricted to boating, hunting, and fishing. The fishery now consists of walleyes, northern pike, catfish, and perch following a carp control program (Narf, 1974a).

Public access is somewhat limited.

III. LAKE AND DRAINAGE BASIN CHARACTERISTICS

A. Lake Morphometry:

1. Surface area: 2,300 acres.
2. Mean depth: 4.6 feet*.
3. Maximum depth: 8 feet.
4. Volume: 10,580 acre/feet.
5. Mean hydraulic retention time: 33 days.

B. Tributary and Outlet:
(See Appendix A for flow data)

1. Tributaries -

Name	Drainage area†	Mean flow†
Rock River	332.0 mi^2	143.6 cfs
Dead Creek	27.3 mi^2	11.2 cfs
Minor tributaries & immediate drainage -	18.1 mi^2	8.9 cfs
Totals	377.4 mi^2	163.7 cfs

2. Outlet -

Rock River	381.0 mi^{2}††	163.7 cfs

C. Precipitation†††:

1. Year of sampling: 40.5 inches.
2. Mean annual: 30.9 inches.

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* Narf, 1974b.

† Drainage areas are accurate within ±0.5%; mean daily flows are accurate within ±40%; mean monthly flows are accurate within ±35%; and normalized mean monthly flows are accurate within ±35%.

†† Includes area of lake.

††† See Working Paper No. 1, "Survey Methods".

IV. LAKE WATER QUALITY SUMMARY

Sinissippi Lake was sampled two times at station 1 and once at station 2 during the open-water season of 1972 by means of a pontoon-equipped Huey helicopter. Each time, near-surface samples for physical and chemical parameters were collected (see map, page vi). During each visit, a single sample was composited from the stations for phytoplankton identification and enumeration, and a sample was collected for chlorophyll a analysis. All samples were collected as near-surface samples.

The results obtained are presented in full in Appendix B and are summarized below. The mean values presented in these summary tables are not volume-weighted; nonetheless, the means are useful as a general guide to differences in water quality at the different sampling times.

A. Physical and chemical characteristics:

Parameter	Mean Values 1st Sample (06/20/72)	2nd Sample (08/21/72)
Temperature (Cent.)	19.3	26.5
Dissolved oxygen (mg/l)	9.3	8.8
Conductivity (μmhos)	530	600
pH (units)	8.5	8.3
Alkalinity (mg/l)	267	202
Total P (mg/l)	0.374	1.020
Dissolved P (mg/l)	0.158	0.220
NO_2 + NO_3 (mg/l)	0.170	0.160
Ammonia (mg/l)	0.040	0.140
Secchi disc (inches)	5	12

Parameter	Min. for all samples	Max. for all samples	Mean for all samples
Temperature	16.9	26.5	21.7
Dissolved oxygen	8.6	10.0	9.1
Conductivity	500	600	553
pH	8.3	8.6	8.4
Alkalinity	202	288	245
Total P	0.344	1.020	0.589
Dissolved P	0.128	0.220	0.179
$NO_2 + NO_3$	0.050	0.290	0.167
Ammonia	0.020	0.140	0.073
Secchi disc	4	12	7

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Number per ml
06/20/72	1. Cyclotella	66,570
	2. Scenedesmus	26,049
	3. Fragilaria	25,326
	4. Nitzschia	5,789
	5. Actinastrum	5,789
	Other genera	20,983
	Total	150,506
08/21/72	1. Cyclotella	44,286
	2. Scenedesmus	28,571
	3. Merismopedia	22,857
	4. Melosira	12,143
	5. Cryptomonas	8,571
	Other genera	28,572
	Total	145,000

2. Chlorophyll a -
(Because of instrumentation problems during the 1972 sampling, the following values may be in error by plus or minus 20 percent.)

Sampling Date	Station Number	Chlorophyll a (µg/l)
06/20/72	01	234.0
	02	181.2
08/21/72	01	92.8

C. Trophic Condition:

Limited Survey data and the records of others show that Sinissippi Lake is eutrophic, and it does not appear that the morphometry and derivation of the lake would permit any other trophic condition. Reportedly, heavy blooms of algae are a common occurrence.

Compared to the 44 Wisconsin lakes that were sampled three times, none had a higher mean total phosphorus, 90% had less mean dissolved phosphorus, none had a higher mean chlorophyll a, all had greater Secchi disc transparency, but 71% had a greater mean inorganic nitrogen (the relatively low level of inorganic nitrogen supports the conclusion that the lake was nitrogen limited when sampled).

V. NUTRIENT LOADINGS
(See Appendix C for data)

For the determination of nutrient loadings, the Wisconsin National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page vi), except for the high runoff months of April and May when two samples were collected. Sampling was begun in September, 1972, and was completed in August, 1973.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Wisconsin District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loadings for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated by using the mean annual concentrations in the Rock River at station A-3 and the mean annual ZZ flow.

The cities of Horican and Juneau and the Village of Clyman declined participation in the Survey, and nutrient loads were estimated*. In the tables that follow, the loads attributed to the tributaries are measured loads minus point-source loads.

---

* See Working Paper No. 1.

A. Waste Sources:

1. Known municipal -

Name	Pop.* Served	Treatment	Mean* Flow (mgd)	Receiving Water
Horicon	3,356	Trickling filter	0.420	Rock River
Juneau	2,043	Act. sludge	0.312	Dead Creek
Clyman	328	Ponds	0.018	Dead Creek tributary

2. Known industrial -

Name	Product	Treatment	Mean* Flow (mgd)	Receiving Water
Milbrew, Inc., Juneau	brewers yeast	lagoon	0.200	Dead Creek
		(cooling water)	0.058	Dead Creek

* Narf, 1974a.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	lbs P/ yr	% of total
a. Tributaries (non-point load) -		
Rock River	86,120	66.1
Dead Creek	23,640	18.1
b. Minor tributaries & immediate drainage (non-point load) -	5,820	4.5
c. Known municipal STP's -		
Horicon	8,390	6.4
Juneau	5,110	3.9
Clyman	820	0.6
d. Septic tanks* -	130	0.1
e. Industrial - Not known	?	-
f. Direct precipitation** -	360	0.3
Total	130,390	100.0

2. Outputs -

Lake outlet - Rock River 128,880

3. Net annual P accumulation - 1,510 pounds

* Estimated 200 dwellings on shoreline; see Working Paper No. 1.
** Estimated; see Working Paper No. 1.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	lbs N/ yr	% of total
a. Tributaries (non-point load) -		
Rock River	1,083,780	85.1
Dead Creek	56,400	4.4
b. Minor tributaries & immediate drainage (non-point load) -	63,430	5.0
c. Known municipal STP's -		
Horicon	25,170	2.0
Juneau	15,320	1.2
Clyman	2,460	0.2
d. Septic tanks* -	4,700	0.4
e. Industrial - Not known	?	-
f. Direct precipitation** -	22,160	1.7
Total	1,273,420	100.0

2. Outputs -

Lake outlet - Rock River 1,276,620

3. Net annual N loss - 3,200 pounds

* Estimated 200 dwellings on shoreline; see Working Paper No. 1.
** Estimated; see Working Paper No. 1.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	lbs P/mi^2/yr	lbs N/mi^2/yr	N/P Ratio
Rock River	259	3,264	13/1
Dead Creek	866	2,066	2/1

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (in press). Essentially, his "dangerous" rate is the rate at which the receiving waters would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

	Total Phosphorus		Total Nitrogen	
Units	Total	Accumulated	Total	Accumulated
lbs/acre/yr	56.7	0.7	553.7	loss*
grams/m^2/yr	6.35	0.07	62.1	-

Vollenweider loading rates for phosphorus (g/m^2/yr) based on mean depth and mean hydraulic retention time of Sinissippi Lake:

"Dangerous" (eutrophic rate)	0.76
"Permissible" (oligotrophic rate)	0.38

* There was an apparent loss of nitrogen during the sampling year. This may have been due to nitrogen fixation in the lake, solubilization of previously sedimented nitrogen, recharge with nitrogen-rich ground water, unknown and unsampled point sources discharging directly to the lake, or (probably) underestimation of nitrogen loads from known point sources.

VI. LITERATURE REVIEWED

Kernan, Lee T., Ronald J. Poff, and C. W. Threinen; 1965. Surface water resources of Dodge County. Conservation Dept., Madison.

McKersie, Jerome, George L. Hansel, Floyd F. Stautz, and Dick Narf; 1969. Report on an investigation of the pollution in the upper Rock River drainage basin made during 1967-1968. Dept. of Natural Resources, Madison.

Narf, Richard P., 1974a. DNR intra-department memorandum (review of preliminary report on Sinnissippi Lake). Dept. of Natural Resources, Madison.

_____, 1974b. Personal communication (mean depth of Sinissippi Lake). Dept. of Natural Resources, Madison.

Vollenweider, Richard A., (in press). Input-output models. Schweiz A. Hydrol.

TRIBUTARY FLOW INFORMATION FOR WISCONSI 9/30/74

LAKE CODE 5541 SINISSIPPI LAKE

TOTAL DRAINAGE AREA OF LAKE 381.00

TRIBUTARY	SUB-DRAINAGE AREA	NORMALIZED FLOWS JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
5541A1	381.00	83.30	107.80	411.70	480.30	215.70	117.60	107.80	74.50	82.30	93.10	107.90	80.50	163.63
5541A2	332.00	72.00	98.00	360.00	430.00	180.00	100.00	95.00	65.00	74.00	84.00	93.00	72.00	143.62
554181	27.30	3.20	6.20	29.00	36.00	11.00	4.90	9.70	5.10	7.10	7.60	8.10	5.80	11.15
554122	21.70	2.40	4.70	23.00	29.00	8.70	3.70	8.30	4.00	5.80	6.10	6.30	4.70	8.88

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 381.00
SUM OF SUB-DRAINAGE AREAS = 381.00

TOTAL FLOW IN = 1963.10
TOTAL FLOW OUT = 1962.50

MEAN MONTHLY FLOWS AND DAILY FLOWS

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5541A1	9	72	500.00	24	850.00				
	10	72	580.00	15	450.00				
	11	72	450.00						
	12	72	150.00	9	130.00				
	1	73	500.00						
	2	73	590.00	28	200.00				
	3	73	1050.00	10	1300.00				
	4	73	960.00	12	650.00	24	1600.00		
	5	73	1100.00	14	1200.00	31	1100.00		
	6	73	450.00	22	200.00				
	7	73	74.00	3	100.00				
	8	73	55.00	12	56.00				
5541A2	9	72	44.00	24	72.00				
	10	72	47.00	15	34.00				
	11	72	34.00						
	12	72	11.00	9	9.40				
	1	73	440.00						
	2	73	520.00	28	170.00				
	3	73	940.00	10	1200.00				
	4	73	830.00	12	570.00	24	1400.00		
	5	73	960.00	14	1100.00	31	920.00		
	6	73	380.00	22	170.00				
	7	73	64.00	3	91.00				
	8	73	48.00	12	48.00				

LAKE CODE 5541 SINISSIPPI LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
554181	9	72	440.00	24	740.00				
	10	72	520.00	15	400.00				
	11	72	400.00						
	12	72	130.00	9	110.00				
	1	73	35.00						
	2	73	42.00	28	11.00				
	3	73	75.00	10	95.00				
	4	73	70.00	12	47.00	24	110.00		
	5	73	58.00	14	64.00	31	56.00		
	6	73	19.00	22	8.60				
	7	73	6.60	3	9.20				
	8	73	3.90	12	3.90				
554177	9	72	36.00	24	58.00				
	10	72	39.00	15	27.00				
	11	72	27.00						
	12	72	8.40	9	.40				
	1	73	28.00						
	2	73	33.00	28	7.60				
	3	73	59.00	10	74.00				
	4	73	56.00	12	38.00	24	92.00		
	5	73	45.00	14	50.00	31	44.00		
	6	73	14.00	22	6.60				
	7	73	5.40	3	7.60				
	8	73	3.00	12	3.10				

APPENDIX B

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 74/09/30

554101
43 21 30.0 088 36 30.0
SINISSIPPI LAKE
55 WISCONSIN

11EPALES 2111202
3 0001 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	00665 PHOS-TOT MG/L P	00666 PHOS-DIS MG/L P
72/06/20	17 42	0000	16.9	8.6	4	500	8.62	246	0.290	0.020	0.404	0.128
72/08/21	12 50	0000	26.5	8.8	12	600	8.30	202	0.160	0.140	1.020	0.220

17.

DATE FROM TO	TIME OF DAY	DEPTH FEET	32217 CHLRPHYL A UG/L
72/06/20	17 42	0000	234.0J
72/08/21	12 50	0000	92.8J

J VALUE KNOWN TO BE IN ERROR

STORET RETRIEVAL DATE 74/09/30

554102
43 23 00.0 088 38 00.0
SINISSIPPI LAKE
55 WISCONSIN

11EPALES 2111202
3 0002 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	00665 PHOS-TOT MG/L P	00666 PHOS-DIS MG/L P
72/06/20	18 00	0000	21.8	10.0	6	560	8.40	288	0.050	0.060	0.344	0.188

DATE FROM TO	TIME OF DAY	DEPTH FEET	32217 CHLRPHYL A UG/L
72/06/20	18 00	0000	181.2J

J VALUE KNOWN TO BE IN ERROR

APPENDIX C

TRIBUTARY DATA

STORET RETRIEVAL DATE 74/10/02

S5414I L5554IAI
43 21 00.0 088 35 00.0
ROCK RIVER
55 15 HORICON
O/SIWNISSIPPI LAKE
ST HWY 109 BRDG IN HUSTIFORD
11FBALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/09/24	08 55		0.150	2.250	0.088	0.031	0.145
73/10/15	14 45		0.570	3.250	0.260	0.240	0.450
73/11/09	16 00		1.020	1.800	0.078	0.138	0.210
73/12/04	09 55		3.500	1.800	0.280	0.399	0.470
73/01/07	09 00		3.100	3.360	0.470	0.280	0.345
73/02/24	17 30		1.860	2.500	0.720	0.280	0.360
73/04/10	10 30		1.340	3.990	1.040	0.160	0.280
73/04/12	16 10		0.378	2.050	0.147	0.060	0.185
73/04/24	16 15		0.320	5.000	0.252	0.105	0.430
73/05/14	16 00		0.300	1.470	0.012	0.105	0.190
73/05/31	16 30		0.399	1.760	0.095	0.189	0.300
73/06/22	10 00		0.450	2.400	0.120	0.044	0.460
73/07/03	11 00		0.460	3.990	0.630	0.231	0.460
73/08/12	16 00		0.150	3.000	1.370	0.610	0.840

STORET RETRIEVAL DATE 74/10/02

5554142 L5554142
43 25 00.0 094 39 00.0
ROCK RIVER
55 15 HORICON
T/SINISSIPPI LAKE
CO HWY S BRDG 2 MI S HORICON BELOW STP
11FBALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/24	09	50	0.151	3.550	0.066	0.005K	0.175
72/10/15	15	30	0.710	2.900	0.360	0.231	0.380
72/11/09	17	30	1.400	2.400	0.076	0.154	0.240
72/12/04	10	20	3.900	2.700	0.240	0.320	0.480
73/01/07	11	40	3.100	2.400	0.420	0.245	0.315
73/02/28	19	00	1.980	2.800	0.910	0.310	0.410
73/03/10	11	20	1.300	3.900	0.890	0.160	0.270
73/04/12	16	50	0.370	1.380	0.005K	0.040	0.115
73/04/24	17	15	0.340	2.000	0.080	0.096	0.200
73/05/14	17	15	0.430	1.470	0.054	0.084	0.155
73/05/31	16	00	0.320	1.620	0.054	0.220	0.290
73/06/22	11	20	0.510	2.900	0.013	0.115	0.470
73/07/03	11	45	0.590	4.012	0.336	0.290	0.540
73/08/12	11	20	1.300	4.100	0.300	0.430	0.545

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 74/10/02

5541A3 L5554143
43 27 00.0 089 38 00.0
ROCK RIVER
55 15 HORICON
T/SINISSIPPI LAKE
CO HWY E BRDG IN HORICON ABOVE STP
11FPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/24	10 30		0.086	2.300	0.070	0.005K	0.440
72/10/15	16 35		0.650	4.450	0.200	0.230	0.340
72/11/09	17 45		1.340	1.760	0.050	0.140	0.200
73/01/07	12 15		3.300	4.800	0.650	0.260	0.490
73/02/24	19 30		1.920	2.600	0.950	0.300	0.375
73/03/10	11 35		1.200	2.300	0.610	0.176	0.260
73/04/12	17 00		0.340	1.680	0.022	0.029	0.100
73/04/24	18 00		0.378	1.900	0.082	0.086	0.125
73/05/14	17 30		0.170	1.260	0.024	0.069	0.125
73/05/31	16 10		0.340	2.500	0.096	0.198	0.270
73/06/22	12 00		0.250	3.170	0.064	0.010	0.450
73/07/03	12 00		0.530	3.100	0.210	0.240	0.450
73/08/12	11 30		1.340	2.400	0.360	0.470	0.630

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 74/10/02

5541R1 LS5541R1
43 21 30.0 088 34 30.0
DEAD CREEK
55 15 HOMICON
T/SKISSIPPI LAKE
NS CO RD CROS 2 MI W 1 MI NOF HUSTISFORD
11FPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/24	09 10		0.127	1.650	0.044	0.005K	0.250
72/10/15	16 00		0.305	1.700	0.280	0.093	0.610
72/11/09	16 10		0.273	1.000	0.023	0.570	0.610
72/12/04	09 20		0.010K	3.650	0.450	3.500	
73/01/07	09 50		0.034	4.300	2.000	1.600	1.880
73/02/28	18 00		0.126	2.700	0.850	0.640	0.795
73/04/12	16 20		0.200	1.200	0.007	0.330	0.390
73/04/24	16 20		0.115	1.760	0.198	0.870	0.930
73/05/14	16 30		0.063	1.260	0.012	0.610	0.660
73/05/31	17 00		0.074	1.680	0.021	0.680	0.760
73/06/22	10 15		0.230	4.200	0.014		2.500
73/07/03	11 15		0.024	5.100	2.200	1.790	1.880
73/08/12	10 15		0.027	9.000	5.200	2.250	2.600

K VALUE KNOWN TO BE LESS THAN INDICATED

STORET RETRIEVAL DATE 74/10/02

5541H2 LS554182
43 23 10.0 088 42 05.0
DEAD CREEK
55 15 HORICON
T/SINISSIPPI LAKE
EW CO RD CROS 1 MI S OF JUNEAU BELOW STP
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/24	09	35	0.126	3.150	0.053	0.005K	0.680
72/10/15	16	15	0.530	8.600	1.130	0.480	1.700
72/11/09	17	00	0.690	18.900	3.300	6.800	10.000
73/01/07	11	00	1.300	8.800	5.300	4.600	5.800
73/02/28	18	30	0.014		0.640	4.800	
73/03/10	11	00	0.020	9.800	7.000	5.800	6.800
73/04/12	13	00	0.980	11.500	0.658	4.500	6.000
73/04/24	16	50	2.100	6.100	0.920	2.600	3.600
73/05/14	17	00	0.390	13.600	0.870	5.800	7.500
73/05/31	17	30	0.310	9.400	1.100	3.600	4.500
73/06/22	11	00	0.168	10.500	0.037		4.900
73/07/03	11	30	3.000	2.500	0.018	0.620	0.850
73/08/12	11	00	2.080	8.700	0.560	4.800	5.400

K VALUE KNOWN TO BE LESS
THAN INDICATED